

## **FINAL FINDINGS OF FACT**

### **Lac du Flambeau Band of Lake Superior Chippewa, Wisconsin**

#### **Information regarding direct impacts and potential direct impacts of existing and future activities of nonmembers within the exterior boundaries of the Lac du Flambeau Reservation on the political integrity, economic security, or health or welfare of the Lac du Flambeau Band of Lake Superior Chippewa and its members**

This document contains the factual findings upon which the U.S. Environmental Protection Agency (EPA) is relying in approving the Lac du Flambeau Band of Lake Superior Chippewa (the Tribe or Band or LdF) request for treatment in the same manner as a state (TAS), under Clean Water Act (CWA) section 518, for purposes of establishing water quality standards and issuing water quality certifications under CWA section 303(c) and 401. The TAS determination is a separate process from EPA's approval of water quality standards that a tribe with TAS adopts and submits to EPA for approval or disapproval.

The Lac du Flambeau Band has applied for TAS status, and this document sets forth the Findings of Fact that are relevant to EPA's determination relating to the Tribe's assertion of authority over nonmember activities on the Lac du Flambeau Reservation (Reservation). Consistent with its practice, EPA prepared Proposed Findings of Fact and, on June 15, 2007, circulated them for comment to the appropriate governmental entity, the State of Wisconsin.<sup>1</sup> EPA also informed local governments and the public and a comment period was held on the Proposed Findings of Fact from June 15, 2007, through July 27, 2007. Through the State of Wisconsin, EPA invited comments on the Proposed Findings of Fact relating to direct impacts and potential direct impacts of nonmember activities on the Tribe or Tribal members within the exterior boundaries of the Reservation. Several comments were received and considered in developing these Findings of Fact. This document reflects EPA's final basis for decision-making.

This Findings of Fact document presents information on the relationship between nonmember activities within the exterior boundaries of the Lac du Flambeau Reservation and the political integrity, the economic security, and the health or welfare of the Tribe. The facts summarized below are based on (1) the Tribe's application materials, including letters sent on October 12, 2005, May 31, 2006, June 27, 2006, and April 3, 2007 (Application); (2) other materials contained in the Administrative Index for this matter; and (3) comments received during the comment period.

#### *The Montana Test*

While Tribes generally have jurisdiction over their members and territory, in *Montana v. United States*, 450 U.S. 544 (1981) (*Montana test*), the Supreme Court of the United States held that

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<sup>1</sup> EPA defines the term "appropriate governmental entities" as "States, tribes, and other Federal entities located contiguous to the reservation of the tribe which is applying for treatment as a State." 56 Fed. Reg. 64876, 64884 (Dec. 12, 1991). The term does not include local governments such as cities and counties. *Id.*

tribes generally lack inherent jurisdiction over nonmember activities on nonmember fee land. However, the Court also found that Indian tribes retain inherent sovereign power to exercise civil jurisdiction over nonmember activities, even on nonmember-owned fee lands within the Reservation, where (i) nonmembers enter into “consensual relationships with the tribe or its members, through commercial dealing, contracts, leases, or other arrangements” or (ii) “. . . [nonmember] conduct threatens or has some direct effect on the political integrity, the economic security, or the health or welfare of the tribe.” *Id.* at 565-66. In analyzing tribal assertions of inherent authority over nonmember activities on Indian reservations, the Supreme Court has reiterated that the *Montana* test remains the relevant standard. See, e.g., *Strate v. A-1 Contractors*, 520 U.S. 438, 445 (1997) (describing *Montana* as “the pathmarking case concerning tribal civil authority over nonmembers”); see also *Nevada v. Hicks*, 533 U.S. 353, 358 (2001) (“Indian tribes’ regulatory authority over nonmembers is governed by the principles set forth in [*Montana*]”). The Findings of Fact set forth below describe how the Tribe has demonstrated its inherent authority over nonmember activities for purposes of the CWA water quality standards and water quality certification programs.

In the preamble to EPA’s 1991 water quality standards regulation, the Agency noted that, in applying the *Montana* test and assessing the impacts of nonmember activities on an Indian tribe, EPA will rely upon an operating rule that evaluates whether the potential impacts of regulated activities on the tribe are serious and substantial. 56 Fed. Reg. 64876, 64878-79 (December 12, 1991). EPA also recognized that the analysis of whether the *Montana* test is met in a particular situation necessarily depends on the specific circumstances presented by the tribe’s application. *Id.* In addition, in that rulemaking, EPA noted as a general matter “that activities which affect surface water and critical habitat quality may have serious and substantial impacts” and that “because of the mobile nature of pollutants in surface waters and the relatively small length/size of stream segments or other water bodies on reservations. . . any impairment that occurs on, or as a result of, activities on non-Indian fee lands [is] very likely to impair the water and critical habitat quality of the tribal lands.” *Id.* EPA also noted that water quality management serves the purpose of protecting public health and safety, which is a core governmental function critical to self-government. *Id.*

The CWA addresses the maintenance and restoration of the physical, chemical, and biological integrity of waters of the United States, including tribal waters, by providing, among other things, for tribes treated in the same manner as states, to act to “prevent, reduce, and eliminate pollution.” CWA Section 101(b), 33 U.S.C. §1251(b). The Act authorizes eligible tribes to carry out certain CWA functions that “pertain to the management and protection” of reservation water resources. The *Montana* “impacts” test analyzes whether the tribe is proposing to regulate activity that “threatens” or “has some direct effect” on tribal political integrity, economic security, or health or welfare. That test does not require a tribe to demonstrate to EPA that nonmember activity “is actually polluting tribal waters,” if the tribe shows “a potential for such pollution in the future.” *Montana v. EPA*, 141 F.Supp.2d 1259, 1262 (D. Mont. 1998), quoting *Montana v. EPA*, 941 F.Supp. 945, 952 (D. Mont. 1996), *aff’d* 137 F.3d 1135 (9<sup>th</sup> Cir. 1998), *cert den.* 525 U.S. 921 (1998). Thus, EPA considers both actual and potential nonmember activities in analyzing whether a tribe has demonstrated authority over nonmember activities under the *Montana* test.

This document sets forth the Findings of Fact EPA believes are relevant for its determination regarding the Tribe's assertion of inherent authority to regulate nonmember activities under the *Montana* test for purposes of the CWA water quality standards and water quality certification programs. This document discusses nonmember activities on the Reservation, including both nonmember-owned fee lands and lands held by the Tribe. To the extent that nonmembers carry out activities on trust lands within the Reservation, such activities do or would result in the same types of impacts as when such activities are carried out on non-member owned lands.

### **The Lac du Flambeau Reservation**

The treaty history of the Ojibwe (Chippewa) tribes in Wisconsin is complex, with treaties negotiated between the United States and the many separate Ojibwe bands over approximately thirty years, beginning with broad land cessions under the treaty of July 29, 1837, Treaty with the Chippewa, 7 Stat. 537.<sup>2</sup> In 1842, many of these same bands signed an additional treaty promising additional land cessions to the United States, 1842 Treaty with the Chippewa, 7 Stat. 591. The Lac du Flambeau Reservation was one of four reservations established within Wisconsin under the 1854 Treaty with the Chippewa which broadly established reservations for "the Chippewa Indians of Lake Superior and the Mississippi."<sup>3</sup>

Pursuant to the 1854 Treaty, in 1863, the Bureau of Indian Affairs (BIA) directed a survey of land for the Lac du Flambeau Reservation, coinciding with the imminent public sale of land surrounding the Tribe's namesake lake.<sup>4</sup>

L.E. Webb, Indian Agent for the Lake Superior Indian Agency, instructed the surveyor in Bayfield, Wisconsin, by letter as follows:

You will consult with the Indians and as far as practicable carry out their wishes in the selection of the land [for the Lac du Flambeau Reservation]. I do not deem it necessary to do anything more than run exterior lines, and you will mark them thoroughly, so that the Indians can understand the limits of the Reservation.<sup>5</sup>

Subsequently, on May 26, 1863, a group of three Lac du Flambeau chiefs petitioned the Agent regarding the survey process, stating:

We, the chiefs of the Lac du Flambeaux [sic] bands of Chippewa Indians, in council assembled, hereby agree to concentrate our Indians to a Reservation the boundaries whereof to be defined and marked by actual survey as pointed out to us this day by

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<sup>2</sup>*La Courte Oreille Band of Lake Superior Indians v. Voigt*, 700 F.2d 341, 344-348 (7<sup>th</sup> Cir. 1983) (recounting treaty history of the Chippewa peoples).

<sup>3</sup>*Treaty with the Chippewas*, art. 2, 3d (ratified Jan. 10, 1855), 10 Stat. 1109.

<sup>4</sup>*Executive Orders Relating to Reserves, Lac Du Flambeau Reserve v. I*, 932-933, <http://digital.library.okstate.edu/kappler/Vol1/Images/v1p0932.jpg> (June 22, 1866).

<sup>5</sup>*Id.* at v. I, 1052, <http://digital.library.okstate.edu/kappler/Vol1/Images/v1p1052.jpg>.

All websites throughout were checked and accessed February 11, 2008, except as noted.

A.C. Stuntz, surveyor, through our interpreter, William W. Johnson, whenever the agent of Chippewa Indians of Lake Superior requires it.

We also petition said Indian agent, our father, and through him our Great Father, the President, that the above-named surveyor be allowed to select for us lands joining our Reservation to make up the full amount covered by lakes that may come within the boundaries whenever subdivided so as to ascertain the same. We also ask that there may be added to our Reservation certain sugar free lands to be selected so that each family living on the Reservation can have their sugar works within the boundaries of the Reservation which will not be embraced in the present Reservation.<sup>6</sup>

The survey, once completed, described exterior boundaries by reference to township and range, and did not exclude water bodies from this area. *Id.* A map of this survey shows waters within the exterior boundary of the Reservation. In 1866, the BIA determined that the original survey had failed to set aside sufficient lands to make up the area pledged in the 1854 treaty, and that year, additional, contiguous lands were added.<sup>7</sup> The map of this subsequent survey also shows the exterior boundary of the Reservation with water bodies marked inside. The Tribe's Application (at Appendix O) describes the Reservation as follows:

Beginning at the section corner common to sections 4 & 5, T. 41 N., R. 6 E., & sections 32 & 33, T. 42 N. R. 6 E. 4<sup>th</sup> P.M.; thence west on the township a distance of twelve miles to the NW corner of section 4, T. 41 N., R. 4 E., thence south one mile; thence east one mile; thence south one mile; thence west one mile; thence south four miles to the SW corner of section 33, T. 41 N., R. 4 E.; thence east on the township line to the NW corner of section 3, T. 40 N., R. 4 E.; thence six miles more or less to the SW corner of section 6, T. 39 N., R. 6 E.; thence south to the SW corner of said section 6; thence east two miles to the SE corner of section 5, T. 39 N., R. 6 E.; thence north to the SE corner of section 32, T. 40 N., R 6 E; thence continuing north a distance of six miles more or less to the township line; thence west one quarter mile more or less to the SE corner of section 32, T. 41 N., R. 6 E.; thence due north to the point of beginning.

The Tribe's Application and supporting documents describe the Reservation as being approximately 86,630 acres in size. Surface waters and wetlands cover approximately 46% of the Lac du Flambeau Reservation. The area within the exterior boundaries of the Reservation comprises the following resources:

* Wetlands	approximately 28% of total Reservation area
* Lakes and Rivers	approximately 18% of total Reservation area
* Forested Uplands	approximately 51% of total Reservation area
* Other	approximately 3% of total Reservation area

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<sup>6</sup>*Id.*

<sup>7</sup>*Id.* at v. I, 932-933, <http://digital.library.okstate.edu/kappler/Vol1/Images/v1p0932.jpg>.

The total population living within the exterior boundaries of the Reservation in 2000 was 2,995 (year-round residents). There are approximately 1,727 tribal members living within the Reservation. In addition to the year-round residents, many nonmembers own second homes on the Reservation and spend time there seasonally. The Tribe's Application estimates that the total Reservation population increases to 7,000 during the summer.

Of the 86,630 total Reservation acres:

- \* 14,595 acres are within the area of Iron County (approximately 17%)
- \* 71,345 acres are within the area of Vilas County (approximately 82%)
- \* 690 acres are within the area of Oneida County (approximately 1%)

The land ownership within the exterior boundaries of the Reservation is:

- \* Tribal Trust Land approximately 46%
  - \* Individual Indian-owned Trust Land approximately 20%
  - \* Land Owned in Fee approximately 34%<sup>+</sup>
- <sup>+</sup> (A small portion of the fee lands on the Reservation is owned by the Tribe and is pending transfer from fee to trust status.)

## **Geology/Soils**

Unconsolidated sediment (till) deposited by glacial ice and glacial-ice meltwater overlies Precambrian crystalline bedrock throughout the area of northern Wisconsin where the Lac du Flambeau Reservation is located. The till is generally buried beneath 40-60 feet of sandy fluvial sediment (material deposited as streambed sediment by streams from melting ice). The glacial deposits have a coarse-grained texture. The till contains approximately 70% sand-sized particles by weight and silt and sand-sized particles make up the remaining 30%. The streambed (fluvial) material is sand and gravel. Soils of the Reservation are coarse-grained because they have been derived, for the most part, from the weathering of these glacial deposits. Soils in upland areas are generally excessively drained sands or sandy loams or well-drained sandy loams. The wet organic soils are generally moss peat over acidic sedge and woody peat soils.

## **Hydrology**

There are four major watersheds on the Lac du Flambeau Reservation:

Lac du Flambeau Watershed Name	Corresponding USGS 8-digit Watershed	Approximate Percentage of Reservation Area in this 8-digit Watershed
Manitowish River Watershed (4.5%)	Flambeau 07050002	81%
Bear River Watershed (76.5%)		
Upper South Fork Flambeau River Watershed	South Fork Flambeau 07050003	9%
Upper Tomahawk River Watershed	Upper Wisconsin 07070001	10%

**Table 1, Watersheds of the Lac du Flambeau Reservation<sup>8</sup>**

**Information Regarding Direct Impacts and Potential Direct Impacts of Existing and Future Activities of Nonmembers Within the Boundaries of the Lac Du Flambeau Reservation**

The following discussion contains factual information pertinent to a determination regarding whether the Tribe has demonstrated inherent authority, under the *Montana* test, over nonmember activities affecting water quality based upon the actual or potential impacts of nonmember activities. The first section below addresses uses of Tribal waters. The second section describes how unregulated activities can cause water quality degradation. The third section discusses specific examples of the impacts of nonmember activities currently taking place on the Reservation, to illustrate how those activities affect or may potentially affect the Tribe.

**A. Role of functions authorized under the CWA in protecting the Tribe's ability to use and benefit from its water resources**

The CWA calls for the maintenance and restoration of the physical, chemical, and biological integrity of waters of the United States. Water quality standards are provisions of federal, state, or tribal law or administrative rules that consist of designated uses, water quality criteria to protect those uses, and an antidegradation policy. Water quality standards serve the dual function of establishing water quality goals for specific water bodies and serving as the regulatory basis for water quality-based treatment controls and strategies. The objective of the CWA, maintenance and restoration of the integrity of the Nation's waters, is directly related to water quality standards that are intended to ensure the full protection of all existing uses and designated uses identified by eligible states and tribes.

Tribal water quality standards are intended to protect the beneficial uses and water quality of Reservation streams, rivers, wetlands, and associated tributaries. In addition to designated uses and water quality criteria, water quality standards include antidegradation provisions that protect all existing uses of surface waters regardless of whether such uses are actually designated in

<sup>8</sup> The Table 1 above is based on information submitted by the Tribe in its Application.

water quality standards. Antidegradation requirements also serve to maintain and protect high quality waters and waters that constitute an outstanding national resource. Further, antidegradation requirements can be utilized by eligible tribes and states to maintain and protect the quality of surface waters that provide unique cultural or ceremonial uses.

While the Tribe's Application emphasizes that water resources are integral to the life and culture of the Tribe as a whole, the Tribe has identified the following specific uses for water within the Reservation, and which all carry equal importance to the Tribe:

- water supply (drinking water supply, industrial water supply, aquaculture)
- fish and aquatic life, including cold water fishery
- recreational uses and tourism
- wild rice cultivation
- wildlife protection
- cultural/ceremonial uses

These uses are further discussed below.

### **1. Water Supply**

The Tribe currently uses and/or may have additional future uses of Reservation water resources as a water supply for industrial, aquaculture, and drinking water uses.

The full protection of industrial water supply uses helps assure the economic welfare of the Tribe. The Tribe owns and operates a business that produces electronic panel instruments and test equipment. The plant is located in downtown Lac du Flambeau and has 150 employees. The plant utilizes surface water for industrial cooling activities. It is important for surface waters to meet standards for industrial uses so that this industrial activity can occur. As explained in the Tribe's Application, if water quality degrades, untreated water would not be usable for industrial cooling.

Water resources are also utilized for the Tribe's fish hatchery, which has been in operation since 1936. The Tribe raises walleye and muskellunge to stock Reservation lakes that are open to the public for fishing. The hatchery relies on the availability of clean ground water and surface water. Both lake and well-water are used to control temperatures for year-round production. The Tribe spends over \$350,000 each year to raise fish to stock Reservation waters with approximately nine million fry and fingerling walleye. Since 1960, the hatchery has raised nearly 600 million walleye fry, three million walleye fingerlings, two and a half million muskellunge fry and just over 125,000 muskellunge fingerlings.<sup>9</sup> Should surface-water resources of the Reservation degrade, the Tribe's Application states that there would be negative consequences for the operation of the hatchery as the Tribe would have to determine alternative methods of procuring clean water to maintain a sustainable fish population.

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<sup>9</sup> Lac du Flambeau Chamber of Commerce, *Lac du Flambeau Attractions*, <http://www.lacduflambeauchamber.com/attractions.htm>

The Tribe operates three public water supply systems that use ground water as the source for their drinking water. Having a safe, adequate supply of drinking water is critical to the health and well-being of the Tribe and its members. The Tribe's Application discusses the interconnection of surface water and ground water. It points out that the contamination of surface water may affect ground water. Therefore, it is important to the Tribe that water quality of Reservation lakes be protected in order to maintain the quality of groundwater, and so they may be used as a surface source of drinking water when needed.

## **2. Fish and Aquatic Life, including Cold Water Fishery**

As explained in the Tribe's Application, ensuring a balanced aquatic life community is important to the Tribe. Water is important to the Tribe's traditional values and cultural practices. Aquatic species are an important food source and fishing is a valued and economically significant recreational activity. An estimated 30-40% of Tribal members fish on the Reservation for subsistence and cultural purposes. It is reasonable to conclude that if water quality degradation occurs, the abundance and diversity of aquatic communities will decline.

Reservation waters are capable of supporting cold-water and cool water fisheries. The Tribe's Application explains that cold and cool water fisheries are especially valued because of the sport fish populations that live in this habitat. Cold- and cool-water species found in the Reservation area include northern cisco (also known as lake herring), northern pike, muskellunge, lake trout, walleye, yellow perch, and large- and small-mouth bass.

Full protection of the aquatic life use of the water also helps ensure the economic well being of the Tribe and its members. The Tribe harvests fish and other aquatic life, and well-stocked clean lakes sustain the water-based recreation businesses that promote tourism. Tourism is a major source of income for the Tribe (and for non-tribal businesses on the Reservation). Tourists come to the area to fish the Reservation waters that support abundant fish populations. The Tribe's Application explains that healthy aquatic systems that support abundant fish populations are vital to the economic security of the Tribe. Based on surveys, the Tribe estimates that 95% of fishers in the summer season, and 35% of fishers in the winter, are non-tribal members. The importance of fishing to the Tribe, as well as the Tribe's primary role in reservation-fisheries management, is further underscored by a Memorandum of Agreement between the Tribe and WDNR.

Through this MOA, the Tribe is authorized to issue fishing licenses. WDNR provides an annual payment to the Tribe of \$50,000, which is used for the Tribe's reservation fisheries management program.<sup>10</sup> Additionally, the Bureau of Indian Affairs provides contract funding to the Tribe to manage the Tribe's fish hatchery and related fisheries management programs.

The Tribe supports nonmember (tourists and summer residents) and member fishing through its fish hatchery, which has been in operation since 1936. The hatchery relies on the availability of clean ground water and surface water. The Tribe spends over \$350,000 each year to raise fish to stock Reservation waters, with approximately nine million fry and fingerling walleye per year. If water quality becomes degraded, and fish populations decline, fishers may go to other areas. The Tribe's Application explains that this would result in significant income loss for the Tribe.

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<sup>10</sup>Wis. Stat. § 29.2295(4m) (2006).

In April and May 2005 the Survey Research Center at the University of Wisconsin at River Falls conducted a survey for the members of the Lac du Flambeau Band on management and conservation of natural and cultural resources on their Reservation. Out of 1211 surveys distributed, 366 were returned (a 30% response rate) producing results that are accurate to within plus or minus 5%. Some of the key conclusions reached by this survey include:

- Water quality is the resource issue that is of greatest concern to Tribal members. Water quality was identified as one of the top three issues by 72% of 261 people who responded to a question about resource issue priorities.
- 90% or more of tribal members expect to fish, boat and swim and 70–80% will use water resources in their spiritual practices, to hunt, or to gather rice.
- 86% of all respondents indicated that programs to ensure drinking water quality are very important to them.
- In terms of water resources, there were three main concerns; mercury in fish, existing water quality and protecting wild rice habitat.<sup>11</sup>

Based on the Tribe's use of aquatic species as an important food source, and the economic importance of healthy aquatic systems and abundant fish populations, EPA concludes that impairment of aquatic life uses would have a direct, harmful impact on the Tribe and its members.

### **3. Recreational Uses and Tourism**

Tribal members use Reservation waters for fishing, boating, and primary contact recreation and secondary contact recreation. The full protection of recreation in and on the water affects tribal welfare by allowing recreational uses of waters for body contact during play and sport without undue threat of disease or loss of aesthetic pleasure.

In addition, the full protection of the recreational use of the water also helps ensure the economic well being of the Tribe and its members. The Tribe and its members realize economic benefits from visitors who come to the area to fish, canoe, swim and otherwise engage in recreational uses of Reservation waters. If water quality becomes degraded, and waters are not safe for boating and swimming, tourists may go to more desirable areas. The Tribe's Application explains that this would result in significant income losses for the Tribe. The Tribe has estimated that reservation lakes generate approximately 10% of the fishing and boating income in Oneida and Vilas Counties, or roughly \$34 million annually.

Additionally, the tourism industry, which is important to the economic well-being of the Tribe, is based in part on the natural setting of the Reservation and the wildlife that lives on the Reservation. There are over 170 miles of cross-country ski trails in Vilas County, and over 70 miles of trails that have been developed and closed to motor vehicle access for hunting, hiking, and cross-country skiing. As of 1998, there were 10 federal campgrounds, 19 state

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<sup>11</sup> Brian Gauthier et al., *Lac du Flambeau Integrated Resource Management Plan Opinion Survey: Spring 2005* i-ii, <http://www.uwrf.edu/src/LDF%20Report%20v2%20.pdf> (Sept. 2005).

campgrounds, two county campgrounds, and 32 private campgrounds in Vilas County, several of which are located on the Lac du Flambeau Reservation. There are also over 600 miles of snowmobile trails.

Based on the Tribe's use of lakes, rivers, and streams for recreational activities, and the economic importance of clean and safe water for tourism, EPA concludes that impairment of recreational uses would have a direct, harmful impact on the Tribe and its members.

#### **4. Wild Rice Cultivation**

Wild rice has been an important resource for the Tribe – and for Ojibwe peoples generally – since before the Tribe's treaty history. The right to gather subsistence resources, including wild rice, was recognized in the major land cession treaties with the Ojibwe.<sup>12</sup> Wild rice continues to have both cultural and nutritional significance to the Tribe today.

Wild rice from water bodies of the Reservation is a significant food source for tribal members, and has great cultural significance for the Tribe. Many tribal members rely on and enjoy wild rice and participate in harvesting wild rice, which is a family and community-based activity. In 2004, 279 tribal members obtained a license from the Tribe to collect wild rice. Wild rice has higher protein content than most cereal grains, making it a nutrient-dense food source. The cultural significance of wild rice dates back to when the Tribe first came to the area. According to Ojibwe legend, when their people came from the east, their migration was prophesied to end where they found food that grew on water. This food they found was wild rice.

Wild rice (*Zizania aquatica*, *Zizania palustris*) is a water-dependent, native grass species, and the only native North American grass with historically documented food use. From germination to the development of blossoms and fruit, the lifecycle of these plants and their particular yield is wholly defined by water quality and water levels. Because these are shallow-rooted plants, the ideal environment is characterized by non-fluctuating (but not inundated) water levels and “slowly circulating, well-balanced, mineral-rich water,” found historically in sheltered sloughs and wetlands of rivers and lakes.<sup>13</sup> Research conducted in Minnesota showed that these plants are sensitive to changes in water quality. For example, they appear to grow best within an alkalinity range of 5 to 250 parts per million (ppm), but the presence of sulfates in water has an adverse impact on growth, and the plants fail to grow if the sulfate level is 50 ppm or greater.<sup>14</sup>

Harvesting wild rice, even today, is a labor-intensive process necessitating direct contact with the rice at all stages of its processing. Many tribes regulate “ricing” activities by location and time to ensure that the rice is picked at the appropriate time (during a 10-day ripening period) and that sufficient quantities of seeds are returned to germinate the next year. Harvesting requires going into ricing areas by boat, identifying ripened grains, and then knocking the grain

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<sup>12</sup>“The privilege of hunting, fishing, and gathering the wild rice, upon the lands, the rivers and the lakes included in the territory ceded, is guaranteed [sic] to the Indians....” *Treaty with the Chippewas*, art. 5 (July 29, 1837), 7 Stat. 537.

<sup>13</sup>Thomas Vennum, Jr., *Wild Rice and the Ojibway People* at 20 (Minnesota Historical Society Press 1988).

<sup>14</sup>*Id.* at 14, see also 12-38.

from the stalks into containers usually using a wooden paddle or stick though some people harvest with their hands. Care is taken so as not to break the stalks, thereby fostering a second harvest. Once collected, the rice must be dried as quickly as possible to prevent mold. The harvested rice is spread out on tarpaulins on the ground then sorted to remove impurities. Once dry, the rice is parched or dried through roasting or heating, both to preserve the grains and to make them edible. Parched rice is then hulled and winnowed to remove the chaff. Individuals who harvest rice, therefore, will have direct contact with both the plants and water within which this crop is grown.<sup>15</sup>

For the Ojibwe peoples, gathering wild rice is not merely the acquisition of nutritional foodstuffs, rather it is a cultural complex of family connections, traditions, history, and spirituality. Protection of wild rice also helps support healthy wildlife populations on the Reservation by providing shelter for them. Wild rice stands provide nesting cover for waterfowl and the grain is an essential food source for water birds, providing more protein than other cereal grains. The rice beds provide ideal living conditions for tiny aquatic crustaceans and insects that form the foundation of most wetland food chains. The insects, leeches, and snails that the plants harbor in summer are also significant protein sources for waterfowl. The invertebrates also provide food for non-game birds. Muskrats eat and build homes from the wild rice vegetation. In turn, mink, otters, eagles, and other predators eat the muskrats.

The continued existence of wild rice beds on the Reservation is dependent on water quality. If water quality is diminished due to pollutant loadings, or hydrological patterns are shifted from the naturally occurring patterns, wild rice will not proliferate. Changes to water quality and/or hydrology may also produce favorable conditions for invasive species that could displace the wild rice.

Based on the Tribe's use of wild rice as a source of food, its cultural significance, and its relationship to healthy wildlife populations, EPA concludes that impairment of wild rice uses would have a direct, harmful impact on the Tribe and its members.

## **5. Wildlife Protection**

The waters of the Lac du Flambeau Reservation, including the abundant wetlands, provide habitat and a source of drinking water for a broad range of wildlife, and many species utilize aquatic resources as a source of food. Wildlife species in the area are those characteristic of the northern forested areas. The common mammals are black bear, white-tailed deer, coyote, porcupine, beaver, red fox, snowshoe hare, otter, raccoon, skunk, gray squirrel, red squirrel, mink, and muskrat. Ruffed grouse and woodcock are the common upland game birds. Wood ducks, mallards, black ducks, and blue-winged teal are found throughout the area. Mergansers, loon, and herons are common. Populations of bald eagles and ospreys and several species of hawks, owls, woodpeckers, and songbirds also inhabit the area. The diversity and abundance of wildlife on the Reservation depend directly or indirectly upon the quality of the water.

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<sup>15</sup>*Id.* at 81-150, 218-54.

The full protection of wildlife uses helps assure that birds, mammals, reptiles, and amphibians that use and depend upon Reservation waters as a source of water, food, and/or habitat will maintain the species diversity and productivity that the Reservation is capable of supporting. Tribal members value and rely upon the diverse and abundant wildlife population as a source of food.

The effective protection of wildlife and the resources upon which wildlife depend help ensure the Tribe's economic well-being by providing business opportunities related to natural areas and wildlife businesses that support hiking, biking, hunting, and other outdoors activities.

## **6. Cultural/Ceremonial Uses**

Respect for the water by Tribal members is founded upon traditional Ojibwe teachings and encompasses the full range of uses of water by living beings, including humans, wildlife and fish. Tribal members engage in various uses of waters important to maintaining the Tribe's cultural heritage. This includes the gathering of aquatic resources for food or medicinal purposes, and other cultural and/or ceremonial uses of water. Ceremonial activities may involve full immersion into waters, inhalation upon steaming, and/or consumption of untreated surface waters. The water resources of the Reservation must be clean and safe for these direct-contact ceremonial uses that are integral to the cultural identity of tribal members.

Based on the Tribe's actual and potential use of surface waters for cultural and ceremonial practices, EPA concludes that impairment of cultural uses would have a direct, harmful impact on the Tribe and its members.

### **B. Potential Effects of Activities on Tribal Resources**

The materials in the Administrative Record Index for this matter demonstrate that the following activities occur or may occur on the Reservation. These include activities carried out by nonmembers:

- residential and commercial development in natural areas/shoreline areas
- filling of wetlands
- cranberry operations
- forestry/logging
- sand and gravel mining

This section discusses the impacts that these activities, including the activities of nonmembers, may have on surface waters. Section C discusses specific examples of how these activities by nonmembers affect or may affect the Tribe and/or Tribal members.

## **1. Land Use and Development Practices**

The Lac du Flambeau Reservation has experienced significant construction and residential development. Actual and potential impacts from these activities are described below and in Section C.

### *Construction*

Storm water runoff from construction activities can result in significant impacts on water quality. As storm water flows over a construction site, it picks up pollutants such as sediment, debris, and chemicals. Polluted storm water runoff can harm or kill fish and other wildlife and reduce water clarity and impair recreational uses. Sedimentation can destroy aquatic habitat and high volumes of runoff can cause stream bank erosion. Runoff from construction sites often contains elevated concentrations of sediments and other pollutants. The WDNR webpage on construction sites states: "From an average construction site, 30 tons of sediment per acre is eroded into nearby waterways. Due to these high erosion rates (lack of vegetation) and high delivery rates (efficient ditches and storm sewers), construction sites are by far the largest source of sediment that pollutes the water resources of Wisconsin."<sup>16</sup>

Under the National Pollutant Discharge Elimination System (NPDES) program, EPA and other agencies regulate storm water discharges from construction sites. The goal of this program is to protect the quality and beneficial uses of surface-water resources from construction activity related storm water pollution runoff. To achieve this goal, discharge permits require operators to plan and implement appropriate pollution prevention and control practices for storm water runoff during the construction period. These "best management practices" are aimed primarily at controlling erosion and sediment transport, but also include controls, including good housekeeping practices, aimed at other pollutants such as construction chemicals and solid waste. Under the Clean Water Act, NPDES permits are used to ensure that discharges meet federally-approved water quality standards.

In areas where much development is taking place, there is necessarily a significant amount of construction activity. The potential for runoff is especially great for construction sites located adjacent to lakes, streams, or wetlands. If polluted runoff is not prevented from soil erosion, spills (e.g., fuel from construction equipment) and construction wastes, construction activity can have harmful effects on surface-water resources. Significant construction activity has taken place on the Lac du Flambeau Reservation, and is expected to continue, as vacation homes, year-round homes, and commercial structures continue to be built in this area. As set forth in the Tribe's Application, in 2006, the Town of Lac du Flambeau experienced the construction of 38 new homes, 53 garages and 50 larger additions including decks, fences, porches, patios, etc. In 2005, there were 43 new homes constructed in the Town of Lac du Flambeau and 50 garages. 2003 and 2004 showed similar construction starts. Development of lakeshore areas for permanent residential, seasonal residential, and other uses, is common across the Reservation, particularly in the areas the Bear River and the Upper Tomahawk River Watersheds.

### *Runoff/Impervious Cover*

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<sup>16</sup>Wisconsin Department of Natural Resources, *Construction Site Erosion Control and Storm Water Management*, <http://dnr.wi.gov/org/water/wm/nps/stormwater/const.htm>.

While storm water runoff from construction sites can generate sedimentation, other sediment sources can include agriculture, urban runoff, construction, and forestry. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades.<sup>17</sup>

Where development occurs and how developments are planned and built have very significant consequences to natural resources and the environment. Habitat can be lost or fragmented as important areas are converted from forests, grasslands, or wetlands to residential, commercial, or industrial uses. Consequently, the functioning of natural systems can also be disrupted. With natural features and natural drainage patterns, most of the rainfall in a watershed will seep into the ground replenishing the ground water table. As permeable cover is replaced by large expanses of impervious

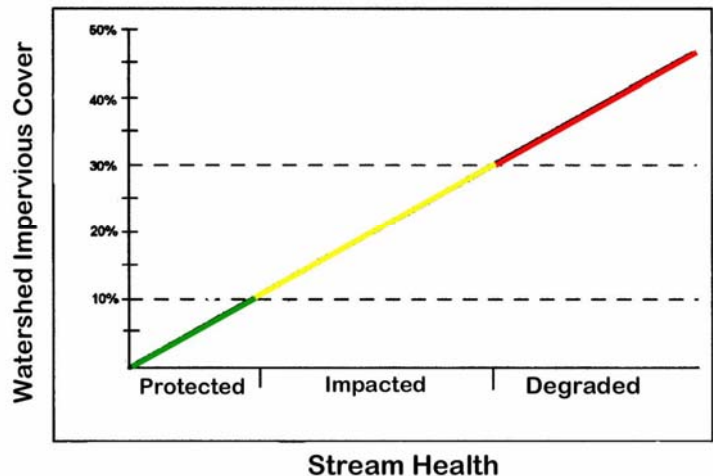
surfaces, instead of infiltrating into the ground, storm water runs across the ground and discharges in a very short time into streams and rivers (Figure 1). This increases peak-flow amounts and peak-flow velocities. Higher flows increasingly degrade the stream channel, scour the stream bottom and erode the stream banks. Water quality becomes degraded as sediments and other pollutants build up in streams and rivers because storm water running across the ground is delivered directly to the stream. As shown in Figure 1, above, the general relationship that is observed is that as the amount of impervious cover in a watershed increases, streams and rivers are increasingly degraded, as is the overall health of the aquatic community.<sup>18</sup>

Runoff from developed areas may occur as either point- or non-point-source discharges. Where it is collected and discharged to surface waters through pipes or ditches, it is regulated as a point-source discharge of pollutants under the NPDES program. The Tribe's Application makes clear the Tribe's desire to ensure that point source discharges are properly managed in order to protect water resources.

### *Landscaping/Use of Fertilizers and Pesticides*

Development along shoreline areas presents particular risks to water resources. If natural vegetation is removed and replaced with impervious surfaces or turf grass, the result is increased

Figure 1  
**Relationship of Impervious Cover to Stream Health**



Center for Watershed Protection

<sup>17</sup> U.S. Environmental Protection Agency, *Stormwater Phase II Final Rule 1*, <http://www.epa.gov/npdes/pubs/fact2-6.pdf> (Dec. 2006).

<sup>18</sup> U.S. Environmental Protection Agency, *How do Land Use and Development Practices Affect the Environment?*, <http://www.epa.gov/greenacres/landuse.html>.

volume of runoff into water bodies and increased loading of pollutants. For example, nutrients (from fertilizers) and pesticides run off turf areas, and oil and grease and other pollutants run off paved areas. A modeling study by the WDNR (Panuska, 1994) compared an undeveloped shoreland lot with the impacts from a large lake home (about 4000 square feet of impervious surfaces) with a lot planted in turf grass. The model estimated that the development of the shoreland lot would produce up to a 500% increase in runoff volume, 700% increase in phosphorus loading, and 900% increase in sediment flowing to the lake.<sup>19</sup>

Excessive nutrient loading entering lake systems may stimulate an increase in the growth of water plants that can cause water bodies to become choked with plant and algal matter. This process is known as eutrophication. Eutrophication can alter the biological community in a water body by changing the species composition and density of the plant and algal community that can also affect fish and other aquatic organisms. In addition, the increased plant and algal biomass can lead to lower concentrations of dissolved oxygen in surface waters when the plants and algae die and decompose. Anaerobic organisms (those that do not require oxygen to live) then attack the organic wastes, releasing gases such as methane and hydrogen sulfide, which are harmful to the oxygen-requiring (aerobic) forms of life. The result can be a foul-smelling body of water with a low degree of clarity/transparency. Fish populations are adversely affected by deficiency in oxygen.<sup>20</sup>

### *Impacts from Septic Systems*

Many homes near lakes, rivers, and streams on the Reservation use septic systems to dispose of domestic wastewater. As set forth in the Tribe's Application, apart from the Tribal sewage system that services approximately 533 homes in the Town of Lac du Flambeau, all other homes on the Reservation, including those on fee lands near lakes, rivers and streams, use septic systems. It is important that septic systems be properly sized, installed, and operated to prevent the spread of infection and disease and to protect water resources. Typical pollutants in household wastewater include oxygen-demanding organic waste, nitrogen, phosphorus, and disease-causing bacteria and viruses.

Inadequately treated sewage from improperly designed or maintained septic systems can be a cause of ground water contamination. It poses a significant threat to drinking water and human health because it can contaminate drinking water wells and cause diseases and infections in people and animals. Improperly treated sewage that contaminates nearby surface waters also

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<sup>19</sup> *Lake Classification Rating Factors, Impervious Areas*, <http://www.co.vilas.wi.us/landconv/zoning/summary.html> [hereinafter *Lake Classification*].

<sup>20</sup> "Oxygen deprivation is also known as hypoxia. With respect to water resources, hypoxia is a condition in which the dissolved oxygen in a parcel of water is low enough to have biological effects. Fish and other creatures can survive short periods of hypoxia, but long periods of reduced oxygen can dramatically alter the ecosystem. EPA defines hypoxic water as water with oxygen concentrations of 2 milligrams per liter or less." U.S. Environmental Protection Agency, *Glossary, hypoxia*, <http://www.epa.gov/owow/oceans/airdep/air5.html>. (website expired – hard copy in file)

increases the chance of swimmers contracting a variety of infectious diseases. These range from eye and ear infections to acute gastrointestinal illness and diseases such as hepatitis.<sup>21</sup>

Pollutant releases to surface waters from septic systems can also contribute to eutrophication of lakes which can lead to the impairment of both human and aquatic life uses. Operation of septic systems adjacent to water resources can result in releases of phosphorus and other pollutants to surface waters due to sandy soil conditions (which do not provide good treatment and do allow septic system discharges to migrate relatively quickly to surface waters), poor maintenance, or inadequate sizing.

Nationally, septic systems are used in approximately 25% of all U.S. homes and for almost 33% of new development. More than half of the existing systems are more than 30 years old. Poorly managed systems have typically been named as a concern by managers of federal, tribal and state programs that deal with water resource issues. According to various reports and studies, an estimated 10% to 20% of septic systems fail each year.<sup>22</sup>

## **2. Filling of Wetlands**

Approximately 28% of the total area of the Lac du Flambeau Reservation is wetlands. Wetlands are among the most productive ecosystems in the world. Key wetland functions include:

- \* ground water recharge/discharge
- \* flood water attenuation
- \* sediment stabilization
- \* sediment retention
- \* nutrient removal
- \* wildlife diversity/abundance
- \* aquatic life diversity/abundance
- \* recreation

Wetlands play an integral role in the ecology of the watershed. The combination of shallow water, high levels of nutrients, and primary productivity is ideal for the development of organisms that form the base of the food web and feed many species of fish, amphibians, shellfish, and insects. Many birds and mammals rely on wetlands for food, water, and shelter, especially during migration and breeding.

More than one-third of the threatened and endangered species in the U.S. live only in wetlands, and nearly half use wetlands at some point in their lives. The WDNR has estimated 75% of Wisconsin wildlife species use wetlands during some stage of their life cycle.<sup>23</sup> For

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<sup>21</sup>U.S. Environmental Protection Agency, *A Homeowner's Guide to Septic Systems* 5, [http://www.epa.gov/owm/septic/pubs/homeowner\\_guide\\_long.pdf](http://www.epa.gov/owm/septic/pubs/homeowner_guide_long.pdf).

<sup>22</sup>U.S. Environmental Protection Agency, *Septic System Basic Information*, <http://cfpub.epa.gov/owm/septic/basics.cfm>.

<sup>23</sup>Wisconsin Department of Natural Resources, *Wisconsin Wetlands*, <http://www.dnr.state.wi.us/org/water/fhp/wetlands/index.shtml>.

many animals and plants, such as wood ducks and muskrat, inland wetlands are the only places they can live. Many of the U.S. breeding bird populations, including ducks, geese, woodpeckers, hawks, wading birds, and many songbirds, feed, nest, and raise their young in wetlands. Migratory waterfowl use wetlands as resting, feeding, breeding, or nesting grounds for at least part of the year.

The majority of tribal cultural and medicinal plants, including Labrador tea, pitcher-plant, and Sphagnum grow in wetlands. Dredging and filling of wetlands result in loss of habitat, diminishment of biological communities, and loss of the hydrological functions that they fulfill. Poorly planned/unregulated dredging and filling activity results in degradation or complete loss of the wetland functions identified above, diminishment of water quality, and impairment of cultural resources and practices.

According to the Corps of Engineers, fill activity does occur on fee lands within the Lac du Flambeau Reservation. The filling of wetlands and other waterbodies occurs during residential development, road construction and bank stabilization by homeowners. The Corps of Engineers requires a permit for any such activity that requires fill to be placed in waters of the Reservation. The potential does exist that dredge and fill activities on fee lands on the Reservation can impact archeological resources and that some dredge and fill activity does occur on fee lands without the required permit.

### 3. Cranberry Operations

The cranberry is a fruit native to the sphagnum bogs of the northern and eastern United States, including Wisconsin. Cranberries have been harvested by Native Americans and European immigrants for centuries, and cultivated commercially in Wisconsin for over a century, primarily by non-members. Cranberry cultivation involves flooding cranberry bogs periodically to eliminate weeds, to aid in harvest, and to protect the plants from freezing. Abundant water is necessary at regular intervals throughout the year for the cultivation of this crop.

According to the Tribe's Application, there are a number of ways that cranberry cultivation may adversely impact water resources if not properly planned, managed, and controlled. These can include:

- **Loss of Wetlands.** Conversion of natural wetlands to cranberry bogs can result in the loss of natural wetland functions.
- **Cranberry cultivation can produce hydrologic changes to stream and/or lake systems.** Such changes can occur when water from flooded cranberry bogs is released to natural water bodies. Streams may have lower flows during dry-weather conditions if large amounts of water are diverted to cranberry bogs, and streams may have higher flows during high-flow conditions due to water being released from bogs that had been flooded. Reducing flows during dry-weather conditions can harm biological communities. Increasing flows during high-flow conditions can increase stream bank erosion and downstream flooding. Cranberry operations can intensify fluctuations in stream flows, which adversely affect stream channel morphology and biological communities.

- **Releases of water from cranberry bogs can impact water quality.** Water releases from cranberry cultivation can increase in-stream temperatures. A number of aquatic species, such as trout, are sensitive to in-stream temperatures, and an increase to water temperatures can have harmful effects on biological communities.
- **Application of nutrients can impact water quality.** Fertilizers contain nutrients such as phosphorous and nitrogen. Fertilizers contained in runoff from farms, or directly applied to waters, such as during cranberry cultivation in upstream lakes and streams, can impact Reservation water quality.
- **Improper Application of pesticides can contaminate water.** Water released from cranberry bogs can release pesticides to connected water bodies. Unregulated pesticides in surface waters can adversely impact biological communities and can have public health effects as well, especially for children, pregnant women and elderly people.

The Administrative Record includes a 1995 letter from a WDNR water quality biologist who had reviewed an application for a U.S. Army Corps of Engineers wetlands fill permit for the expansion of a cranberry operation on the Lac du Flambeau Reservation. In this letter, the WDNR biologist reported to EPA that the direct discharge of nutrients by the cranberry beds will decrease water clarity, increase algae production and accelerate aging of the lake, causing significant degradation of water quality in Great Corn Lake. The 1995 letter also expressed concerns regarding the discharge of pesticides from the cranberry operation into Great Corn Lake.

#### 4. Forestry/Logging

The Lac du Flambeau Reservation contains extensive woodlands, as essentially half of the Reservation is forested uplands. Forestry activities have long been prevalent on the Reservation and in the surrounding area. Forestry and related activities have a significant potential to adversely impact water quality, largely through sediment and pollutants that enter surface waters through increased runoff. Logging takes place within the boundaries of the Lac du Flambeau Reservation, and the timber industry continues to be a significant part of the economy in the area of the Lac du Flambeau Reservation. According to the Tribe, 45,000 acres of trust lands are currently managed within the Tribe's forestry program. Some of these lands are leased for timber sale and harvest to members and non-members.<sup>24</sup> As explained in the Tribe's Application, within the Lac du Flambeau Reservation there are currently 3,151.06 acres of fee land that are enrolled in the Wisconsin Managed Forest Law program and another 1,113.07 acres in the Forest Crop Law program. Lands enrolled in this program are required to have written plans for logging and other purposes.<sup>25</sup>

The State of Wisconsin has estimated that approximately 3-5% of the non-point-source pollution in the State is from forestry activities. Although the 3-5% figure may seem relatively minor, impacts from localized non-point-source pollution can be significant. The State has reported that sediment is the primary pollutant associated with forestry activities and that stream crossings for

<sup>24</sup> Lac du Flambeau: Band of Lake Superior Chippewa Indians, *Tribal Forestry Program*, [http://www.lacduflambeautribe.com/Tribal\\_Programs/Forestry.htm](http://www.lacduflambeautribe.com/Tribal_Programs/Forestry.htm).

<sup>25</sup> "Forest Tax Laws," <http://dnr.wi.gov/forestry/ftax/>

forest roads and skid trails usually cause the most damage to water quality. The State has noted that non-point-source pollution is now regarded as the largest remaining pollution threat to Wisconsin's waters, so properly managing forestry activities is important to the protection of water quality.<sup>26</sup>

If not properly planned and managed, forestry/logging practices can have significant adverse effects on surface-water resources. Clear-cutting of trees leads to erosion of soil, which runs off into surface-water bodies. Cutting trees beside a water body can elevate water temperatures and destabilize banks. Pesticides applied to a stand of trees can leach to a nearby waterway through ground water and/or be carried with the soil by storm water. Poor forestry practices can harm aquatic life by adding pollutant loads to water bodies and limit sources of food, shade, and/or shelter.

Another water quality concern associated with forestry/logging practices is the deposition of logging debris in waterways. Most streams have some amount of organic debris present. This organic material provides food and cover for various aquatic organisms. However, excessive amounts of organic debris can adversely affect water quality in several ways. First, the physical presence of greater than normal amounts of debris interferes with the natural hydrology of a waterway. Water may back up and flood areas that are not normally wet, movement of aquatic organisms may be hindered, and parts of small streams may be starved of water due to the damming effect of upstream debris. In addition, as this debris begins to decay, there is an increased demand for oxygen by microorganisms breaking down the organic matter. This increased oxygen demand can deplete the oxygen dissolved in the water and kill aquatic organisms.

Several studies have indicated that as much as 90% of the total sediment production from forestry operations is related to forest roads. This means that careful planning of road placement, design, and maintenance is extremely important. Forest roads can be a source of sediment from the time construction begins until they are no longer needed, particularly if the road has steep grades, stream crossings, and poorly drained areas along its length.<sup>27</sup>

Some studies have suggested that forestry practices can increase concentrations of mercury and methylmercury (MeHg) in runoff to streams and lakes. Porvari, Verta, Munthe, and Haapanen (2003) observed significant increases in the runoff output of total mercury (TotHg) and MeHg from a spruce forest catchment after clear-cutting and soil treatment. These results indicate forestry practices can act as an important source, in addition to atmospheric deposition of mercury, of TotHg and MeHg to forest lakes. The researchers stated that clear-cutting and/or

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<sup>26</sup>Wisconsin Department of Natural Resources, *Frequently Asked Questions, Wisconsin's Forestry Best Management Practices for Water Quality, Why were Forestry BMPs developed* [sic], <http://www.dnr.state.wi.us/ORG/land/forestry/faq.htm#bmp3> (last revised Sept. 1, 2006). (website expired, hard copy in file)

<sup>27</sup>Kathryn Flynn, *Forest Practices And [sic] Water Quality: Guidelines for Landowners, How Forest Landowners Can Protect Water Quality, Planning Forest Roads*, <http://www.aces.edu/pubs/docs/A/ANR-1031/>.

soil treatment significantly increases the mobility of TotHg and MeHg accumulated in forest soil and may thus be an important factor for the total input of Hg to boreal freshwater ecosystems.<sup>28</sup>

In another study, Kolka, Grigal, Nater, and Verry (2001) concluded watershed disturbances that stimulate the transport of particulates and/or lead to higher water yields (e.g., construction, forest harvesting) will likely lead to greater TotHg in runoff and subsequently in surface waters. The researchers recommended that strategies that control or lessen particulate transport to surface waters, such as the use of buffer strips or erosion control devices, should be considered to minimize TotHg transport.<sup>29</sup>

The Tribe's Application explains that mercury is of great concern, especially its presence in Reservation waters. Mercury generally is a pollutant of great concern due to its effects on aquatic communities and human health, particularly when it is converted to MeHg. When mercury is released into water bodies, certain microorganisms can convert mercury into MeHg, a highly toxic form that builds up in fish and animals that eat fish. People can become exposed to MeHg when they eat fish from lakes with elevated levels of MeHg. There are significant adverse health effects associated with ingestion of MeHg. For fetuses, infants, and children, the primary health effect of MeHg is impaired neurological development. MeHg exposure in the womb, which can result from a mother's consumption of fish and shellfish that contain MeHg, can adversely affect a baby's growing brain and nervous system. Impacts on cognitive thinking, memory, attention, language, and fine motor and visual spatial skills have been seen in children exposed to MeHg in the womb. Instances of methylmercury poisonings have demonstrated that adults, children, and developing fetuses are at risk from ingestion exposure to methylmercury. After ingestion of methylmercury-laden fish, some mothers with no symptoms of nervous system damage gave birth to infants with severe disabilities, indicating that the developing nervous system of the fetus may be more vulnerable to methylmercury than that of an adult.<sup>30</sup>

In addition to those noted above, effects of methylmercury poisoning may include impairment of peripheral vision; disturbances in sensations; lack of coordination of movements; impairment of speech, hearing, walking; and muscle weakness.<sup>31</sup>

Birds and mammals that eat fish are more exposed to mercury than other animals in water ecosystems. Similarly, predators that eat fish-eating animals may be highly exposed. At high levels of exposure, MeHg's harmful effects on these animals include death, reduced reproduction, slower growth and development, and abnormal behavior.<sup>32</sup>

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<sup>28</sup>Petri Porvari et al., *Forestry Practices Increase Mercury and Methyl Mercury Output from Boreal Forest Catchments*, Vol. 37, No. 11 Environmental Science and Technology, (2003).

<sup>29</sup>R.K. Kolka, *Hydrologic Cycling of Mercury and Organic Carbon in a Forested Upland-Bay Watershed*, 65 Soil Sci. Soc. Am. J. 897, 903-904 (2001).

<sup>30</sup>U.S. Environmental Protection Agency, *Mercury, Health Effects, Methylmercury effects*, <http://www.epa.gov/mercury/effects.htm>.

<sup>31</sup>*Id.*

<sup>32</sup>*Id.* at <http://www.epa.gov/mercury/about.htm>.

## **5. Sand and Gravel Mining**

The WDNR notes that:

Nonmetallic mining is a widespread activity in Wisconsin. The variety of geologic environments provides for a diverse industry. An estimated 2,000 mines provide aggregate for construction, sand, gravel and crushed stone (limestone and dolomite) for road building and maintenance as well as for agricultural use as lime. A smaller number of sites provide dimension stone for monuments, volcanic andesite for shingles, peat for horticulture and landscaping, industrial sand for export out-of-state for the oil industry and a considerable variety of materials for other uses.<sup>33</sup>

The WDNR regulates nonmetallic mining operations within its jurisdiction through permits that require management of topsoil salvage and storage, surface and ground water protection, erosion controls, and contemporaneous and post-closure reclamation of mining sites.

Studies of sand and gravel mining have found that unregulated operations threaten both surface water and ground water; especially where they take place within an aquifer recharge area because mining takes away material that would otherwise act as a barrier between the ground water table and the surface of the land. Mining activities can expose shallow aquifers, leaving ground water exposed to risks of direct contamination. Mining also results in runoff to surface waters of particulate-laden rinse waters unless regulations provide for installation of settling ponds prior to the discharge of this rinse water. Additionally, reclamation of mining sites through backfilling excavation pits can also threaten ground and surface waters where excavation pits have been used as informal landfills or filled with mixed industrial and/or mining wastes.

### **C. Impacts of Nonmember Activities on the Lac du Flambeau Band**

The following section provides specific examples of current nonmember activities on the Reservation and the effects of these activities on the health and welfare of the Tribe and its members.

#### **1. Land Use and Development, Particularly Along Shoreline Areas**

Population growth is taking place in and around the Reservation, particularly in Vilas County where population rose from 17,707 in 1990 to 21,033 in 2000, a 19% increase over this 10-year period. The estimated population in 2005 was 22,330. Population in Iron County increased by 11.5% between 1990 and 2000 and in Oneida County 16% over this 10-year period.

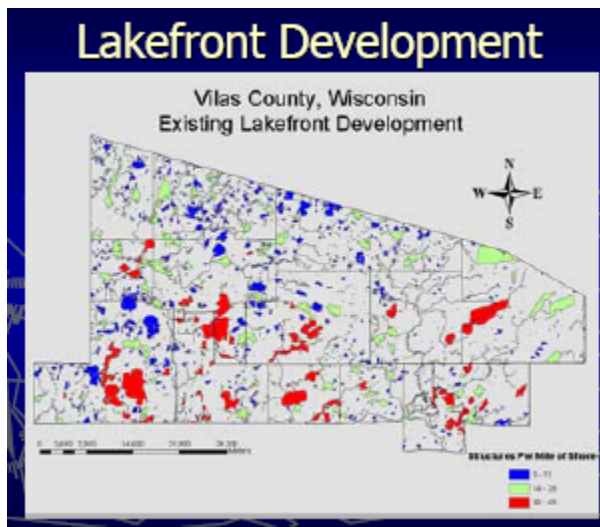
Housing construction is ongoing for the area's growing population (see Figures 2 and 3 below). In particular, waterfront property is valued most highly and has the greatest potential to affect water quality, both during construction and after completion. The State has a shoreland

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<sup>33</sup>Wisconsin Department of Natural Resources, *Nonmetallic Mining in Wisconsin*, <http://www.dnr.state.wi.us/org/aw/wm/mining/nonmetallic> .

ordinance (Wis. Admin. Code ch. NR 155) and the Counties of Oneida, Iron and Vilas have local zoning requirements. The existence of these requirements helps reduce impacts to waters on and around the Reservation. However, construction on and near shorelines may impact waters of the Reservation. Some examples include:

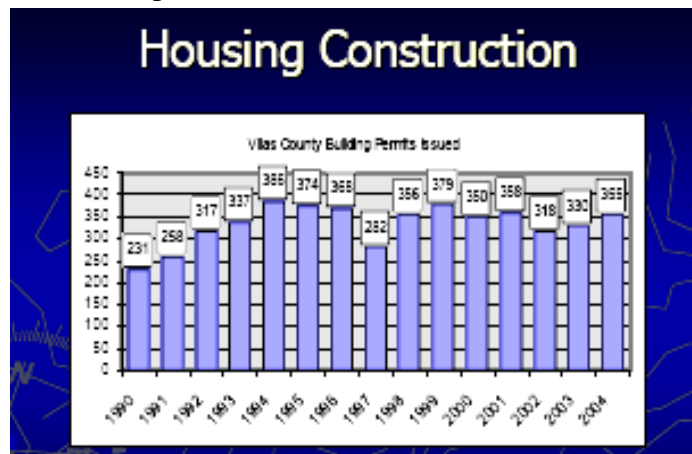
A. Many seasonal and permanent residential properties in the area have boathouses or permanent structures used for the storage of watercraft and associated materials. Construction and use of boathouses can affect water quality. As set forth in the Tribe's Application, in 2005, there were three new boathouses and in 2006, there were four new boathouses built within the town of Lac du Flambeau. Since 1999, Vilas County has recognized the need to regulate boathouse construction so as to minimize shoreline erosion.<sup>34</sup> If construction activities are not properly managed, erosion can occur from disturbed areas; erosion from boathouse sites is of particular concern because the



[http://www.humolegy.wisc.edu/limnology/presentations/golding\\_land-use.pdf](http://www.humolegy.wisc.edu/limnology/presentations/golding_land-use.pdf)

**Figure 2**

[http://www.limnology.wisc.edu/presentations/golding\\_land-use.pdf](http://www.limnology.wisc.edu/presentations/golding_land-use.pdf)



[http://www.humolegy.wisc.edu/limnology/presentations/golding\\_land-use.pdf](http://www.humolegy.wisc.edu/limnology/presentations/golding_land-use.pdf)

sites are adjacent to the water, and sediment and other pollutants are quickly transferred from the land to the water during and after rain events. Another concern with boathouse construction, if not properly managed, is the loss of native vegetation adjacent to the water body, which traps pollutants, stabilizes the shoreline, and provides habitat functions. A further concern is the releases of oils or fuels from boathouses due to leaks or spills during boat maintenance activities. Certain activities associated with boat

**Figure 3**

[http://www.limnology.wisc.edu/presentations/golding\\_land-use.pdf](http://www.limnology.wisc.edu/presentations/golding_land-use.pdf)

ramps are also a concern for the Tribe. There is at least one boat ramp on almost every major lake in Vilas County.<sup>35</sup> The activities that take place at boat ramps and adjoining parking areas can have adverse impacts on surface-water bodies. Oil, grease, and other materials can be deposited by vehicles on parking areas and lubricants and

<sup>34</sup> Vilas County Shoreland and Zoning Ordinance, Article 7, <http://www.co.vilas.wi.us/>.

<sup>35</sup> Discover Boating, *Boat Marinas & Ramps*, <http://www.discoverboating.com/boating/marinas.aspx?countyid=3112>

fuels can be deposited on parking surfaces and ramps as a result of boat/engine maintenance activities. These pollutants wash into the water bodies after rain events.

B. Since 2003, there have been five applicants on the Lac du Flambeau Reservation that have sought coverage under EPA's National Pollutant Discharge Elimination System General Permit for storm water construction discharges. These projects have included water and sewer rehabilitation, housing development, and gravel pits. Each of these projects has exceeded 1 acre in size, the largest being a 32-acre municipal sewer and water rehabilitation project.<sup>36</sup>

C. Officials from Vilas County have acknowledged development activities in the area can have a significant impact on the well-being of people living in the area:

Because surface water can be significantly affected by activities that occur within a watershed, development along lake and river shorelines in Vilas County has the potential to negatively impact water quality. Residential development activities such as construction and land disturbance, increased runoff due to increased impervious surfaces, septic systems, lawn fertilizers, storm water runoff, and the removal of natural shoreline vegetation can contribute sediment, nutrients, and other pollutants to waterways. Water clarity often declines as a result of increased sediment, and inputs of nutrients as nitrogen and phosphorus can cause excessive aquatic plant and algae growth. A significant increase in shoreline development can therefore lead to a decrease in water quality on many lakes, ultimately changing the very nature of lake ecosystems.

It is important to protect and maintain the quality of Vilas County's lakes and rivers. Minimizing development impacts to waterways will help to protect long term water quality, maintain the region's biological integrity, and preserve the economic value that these resources provide.<sup>37</sup>

D. Non-native species can be introduced to a water body by the practices of boaters at boat ramps. For example, a plant native to one lake can become entangled in a boat or trailer, and then be introduced to a different lake where it is not native when the boat or trailer is moved. Non-native species pose a threat to the land and water resources of the Reservation by competing out native species and degrading habitats. Some of the common non-native species present in the area of the Reservation include Eurasian water milfoil, rusty crayfish, and purple loosestrife. Eurasian water-milfoil is an invasive aquatic plant. It can be spread by transport of fragments from one water body to another by boats and boat trailers. Eurasian water milfoil has been documented in many Vilas County Lakes, including: Big Sand, Long, Catfish, Cranberry, Eagle, Duck, Yellow Birch, Otter, Watersmeet, and Scattering Rice.<sup>38</sup>

<sup>36</sup> <http://cfpub2.epa.gov/npdes/stormwater/noi/noisearch.cfm> (This is a link for the NPDES NOI search tool. Hard copies of the five NOIs mentioned above are in the project file.)

<sup>37</sup> Vilas County Land, Air, and Water Conservation Department, *Vilas County Land and Water Resource Management Plan* 26, [http://www.co.vilas.wi.us/landconv/l\\_w\\_plan\\_final.pdf](http://www.co.vilas.wi.us/landconv/l_w_plan_final.pdf) (Aug. 2000) [hereinafter *Management Plan*].

<sup>38</sup> [http://co.vilas.wi.us/landconv/l\\_w\\_plan\\_final.pdf](http://co.vilas.wi.us/landconv/l_w_plan_final.pdf).

E. Development of shoreland areas by non-members has contributed to an increase in sedimentation and a reduction of viable fish spawning areas. According to information submitted by the Tribe, sedimentation and other stressors on water bodies can also lead to decreases in wild rice yields.<sup>39</sup>

F. A University of Wisconsin study of Ike Walton Lake, which is wholly encompassed within the Lac du Flambeau Reservation, noted increased sedimentation in this lake.<sup>40</sup> The study indicates that there have been increased sedimentation rates in Ike Walton Lake since permanent settlement and sustained elevated rates of sedimentation after European settlement. Further, this study indicates that vegetation changes and within-lake chemical changes occurred after European settlement. The changes and impacts noted in this report were caused by various anthropogenic factors including occupation by hunter-gatherer peoples, French traders, commercial logging and European settlements.

G. Vilas County, in the Findings of Fact for its Shoreland Zoning Ordinance, asserts:

...

**1.2.B.** Uncontrolled use of the shorelands and pollution of the navigable waters of Vilas County would adversely affect the public health, safety, convenience, general welfare and economic base of Vilas County.

...

**1.2.D.** Given high levels of existing development on some water bodies, increased pressure for development of shorelands on many others, and the varied sensitivity of lakes, rivers, and streams in Vilas County to impacts from such development, it is necessary that classes of water bodies meet certain standards more restrictive than the minimum standards required by state law to fully achieve the purposes of this ordinance.

Vilas County developed a classification system to categorize lakes based on their sensitivity to development impacts. In explaining the basis for this system the County states, "A variety of studies have indicated that the impacts of development can diminish water quality, natural fish reproduction, wildlife habitat, and natural beauty - ultimately the very things people seek out when they choose to visit or live on lakes and rivers." The following criteria were used by Vilas County to classify lakes based on their sensitivity to development impacts:

- \* lake surface area
- \* shoreline
- \* flushing index (pollution sensitivity)
- \* stratification factor (pollution sensitivity)
- \* soil development factor

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<sup>39</sup> Tribe's Application Attachment X and AC: Meeker 1999, Thomas 1969.

<sup>40</sup> Dr. Marjorie G. Winkler, *The Paleocology and pH History of Ike Walton Lake in Comparison with the Recent History of Zee Lake*, Final Report to the Lac Du [sic] Flambeau Water Resources Program Contract #1243 (1996).

The criteria provide a relative rating system to group lakes over 50 acres in size into one of three sensitivity levels: low, medium and high. The county found that a number of lakes on the Reservation are highly sensitive to impacts from development, including Big Crooked Lake, Broken Bow Lake, Ellerson Lake (Middle), Haskell Lake, Statenaker Lake, and Tippecanoe Lake.<sup>41</sup>

H. Vilas County officials have also recognized that septic systems can pose risks to water resources and enacted an ordinance to better manage septic systems. The enactment of these provisions was driven by general lake water quality concerns over the pollution of surface waters resulting from failing older systems, and public health and safety concerns over direct pollution of ground water from older systems.<sup>42</sup> As set forth in the Tribe's Application, most homes on the Reservation use septic systems to dispose of domestic wastewater. Apart from the Tribal sewage system that services approximately 533 homes in the Town of Lac du Flambeau, all other homes on the Reservation, including those on fee lands near lakes, rivers and streams, use septic systems.

I. Development activities along shoreline areas have been shown to affect species diversity. Researchers from the University of Wisconsin have investigated how lakeshore habitats affect biodiversity, including avian species' diversity. The researchers examined effects of decreased shoreline vegetation on the abundances of birds and frogs in Vilas County. The researchers surveyed 20 sites paired by lake with either no or abundant shrub layer vegetation structure. Variables measured in 2005 were avian richness on three mornings (June); frog abundance on three nights (July); insect abundance over three weeks; proportion of lakeshore covered by lawn; and canopy cover. The results show that vegetation structure alterations and property size scale can decrease avian diversity.<sup>43</sup>

Properties near water resources are attractive to developers and purchasers. Research on this relationship was released in 2004. The researchers hypothesized that the presence of aquatic ecosystems influences the spatial distribution of human land use/cover of the nearby landscape and that this influence has changed through time from the 1930s to the 1990s. To test this hypothesis, the researchers compared the distribution of residential, agricultural, and forested land use/cover around aquatic ecosystems (lakes, wetlands, and streams) to the overall regional land use/cover proportion in an area in southeast Michigan. The researchers also compared the distribution of land use/cover around county roads/highway and towns (known determinants of many land use/cover patterns) to the regional proportion. The researchers found that lakes, wetlands, and streams were strongly associated with the distribution of land use/cover, that each ecosystem type showed different patterns, and that the magnitude of the association was at least as strong as the association with human features. The research also found that the area closest to

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<sup>41</sup> *Lake Classification*, *supra* n. 18, at *Lake Classifications for Lakes Over 50 Acres*, <http://www.co.vilas.wi.us/landconv/zoning/summary.html>.

<sup>42</sup> *Lake Classification*, *supra* n. 18, at *Septic System Stewardship*, <http://www.co.vilas.wi.us/landconv/zoning/summary.html>.

<sup>43</sup> Effects of Lakeshore Vegetation Structure on Avian and Amphibian Diversity in Northern Wisconsin (Poster), Bridget Henning and Alysa Remsburg, University of Wisconsin-Madison, Wisconsin Wetlands Association, <http://www.wisconsinwetlands.org/2006WetlandScienceForumProgram.pdf>

aquatic ecosystems (less than 500 meters) was more strongly associated with land use/cover distribution than areas farther away.<sup>44</sup> This research indicates that if growth continues in and around the Lac du Flambeau Reservation, much of the development will be near the valuable water resources.

J. The draft Iron County Comprehensive Plan states, "Arguably, the most significant concern facing northern lakes is overuse and development. Over the past 30 years, nearly two-thirds of all lakes ten acres and larger were developed in northern Wisconsin. Continuing pressures are being placed on water resources and the number of people using these resources continues to grow annually."<sup>45</sup>

K. As set forth in the Tribe's Application, four Brownfields sites are located on fee lands on the Reservation. Two of these are former junkyards and two are former industrial/commercial sites. By definition, these sites contain or have a potential to contain a hazardous substance, pollutant or contaminant that requires investigation and possible remediation prior to redevelopment. These sites are listed with the EPA.

## 2. Filling of Wetlands

As shown in the Tribe's Application, the loss of wetlands on the Reservation may have direct, harmful impacts on the Tribe and its members, in terms of changes to hydrology and water quality, loss of habitat, and subsistence/cultural and recreational activities (e.g., hunting).

A. Vilas County has recognized that wetland loss in the areas is a significant matter in the region: "The biggest concern with wetlands is their rate of loss. Wisconsin originally had between 10 and 12 million acres of wetlands; today, over one-half of these have been drained for agriculture or development (residential, roads, commercial, etc.)."<sup>46</sup> Statewide, Wisconsin has lost more than five million acres of wetlands, which is estimated to be more than half of its original wetland base since European settlement.<sup>47</sup>

B. Loss of wetlands and other factors such as loss of upland habitat puts native plant and animal species at risk. As noted above, approximately 10% of the Reservation is located in the Upper Tomahawk River watershed. The State has identified the following plant and animal species in this watershed to be at risk:<sup>48</sup>

### 1. Dragons mouth, *Arethusa bulbosa*, special concern

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<sup>44</sup>D.T. Rutledge, *Lakes, Wetlands, and Streams as Predictors of Land Use/Cover Distribution Abstract*, <http://www.springerlink.com/content/uh3drx1xwc0ypk1u/>.

<sup>45</sup>*Iron County Comprehensive Plan, Natural, Agricultural, and Cultural Resources*, 5.1 Natural Resources 5-12, 5-13, <http://www.nwrpc.com/nwrpc/communitydev/other/bycounty/ironcounty/Element%205%20-%20Natural,%20Agricultural,%20and%20Cultural%20Resources.pdf> (Nov. 2005).

<sup>46</sup>*Management Plan*, *supra* n. 33, at 25, [http://www.co.vilas.wi.us/landconv/l\\_w\\_plan\\_final.pdf](http://www.co.vilas.wi.us/landconv/l_w_plan_final.pdf).

<sup>47</sup>Wisconsin Legislative Reference Bureau, *Tap the Power, Wisconsin's Wetlands*, <http://www.legis.state.wi.us/LRB/pubs/tp-12-2004.html>.

<sup>48</sup>*Management Plan*, *supra* n. 33, at 71, [http://www.co.vilas.wi.us/landconv/l\\_w\\_plan\\_final.pdf](http://www.co.vilas.wi.us/landconv/l_w_plan_final.pdf).

2. Plantain shoreweed, *Littorella americana*, special concern
3. Purple bladderwort, *Utricularia purpurea*, special concern
4. Twin stemmed bladderwort, *Utricularia geminiscapa*, special concern
5. Small purple bladderwort, *Utricularia resupinata*, special concern
6. Robbins spikerush, *Eleocharis robbinsii*, special concern
7. Frigga fritillary, *Boloria frigga*, special concern
8. Tawny crescent spot, *Phycoides batesii*, special concern
9. Lake herring, *Coregonus artedii*, rule
10. Wood turtle, *Clemmys insculpta*, threatened
11. Pickerel frog, *Rana palustris*, special concern
12. Lynx, *Lynx canadensis*, endangered
13. Pine marten, *Martes americana*, endangered
14. Bald eagle, *Haliaeetus leucocephalus*, threatened
15. Gaspe Floater, *Anodonta cataracta marginata*, special concern

Several of these species depend on habitat in or near wetlands at some point(s) in their life cycles.

C. As set forth in the Tribe's Application, in a letter dated May 28, 2004, the Corps of Engineers notified a fee land resident that the Corps of Engineers had determined that he developed an access path through a forested wetland, adjacent to Muskesin Lake that was 93-foot long and, on average, 10-foot wide, with approximately 6-12 inches of fill lying above the wetlands surface. This was conducted without the proper permits from the Corps of Engineers. The construction of this path caused flooding on the upstream side of the wetland.

### **3. Cranberry Operation**

A. Great Corn Lake (33 acres) is located entirely within the exterior boundaries of the Lac du Flambeau Indian Reservation. Little Corn Lake (25 acres) is located on the border of the Reservation (approximately 50% of the lake is within the Reservation). Little Trout Lake is a relatively larger lake (approximately 980 acres) also partially within the Reservation. There are cranberry operations adjacent to or near these lakes which have effects on these water bodies.<sup>49</sup>

A United States Army Corps of Engineers report found that 51% of the net phosphorus loading to Little Trout Lake is attributable to cranberry operations.<sup>50</sup> Loadings of phosphorus and other nutrients affect lake clarity and the degree of lake eutrophication. Within-lake algae have increased in the past 60 years since establishment of the cranberry operations adjacent to the lake. The University of Wisconsin concluded in their 2006 study: "The evidence in our study of the impacts of the cranberry operation on Inkspot Bay and Little Trout Lake documents chemical changes to the water and to the sediments and biological changes in the lakes. There are increased nutrients and increased toxic elements in both bodies of water."<sup>51</sup>

<sup>49</sup>The cranberry bogs to the north of Little Trout Lake are not within the Reservation boundaries.

<sup>50</sup>St. Paul District of U.S. Army Corps of Engineers, *Little Trout Lake Section 22 Phase I Hydrological and Water Quality Review and Study Recommendations*, 14 App. K:7, (April 2006).

<sup>51</sup>Marjorie Winkler and Patricia Sanford, *Environmental Changes in the last Century in Little Trout Lake, Inkspot*

B. In 1993, a cranberry grower clear-cut approximately 50 acres of mixed forest adjacent to the east and southeast shoreline of Great Corn Lake and constructed dikes for the operation of an upland cranberry marsh. Since inception, the cranberry operations have drastically altered the water and nutrient balances of the Corn Lakes. The operations withdraw and discharge water to the Corn Lakes. Alkalinity and specific conductance (an indirect measure of the presence of dissolved solids such as chloride, nitrate, sulfate, phosphate, sodium, magnesium, calcium, and iron, and can be used as an indicator of water pollution) have been documented by the U.S. Army Corps of Engineers as increasing since 1993.<sup>52</sup>

C. Pesticides used in cranberry operations are present in Reservation lakes. In water samples from Little Trout and the Corn Lakes, five pesticides commonly used on cranberries (2,4-D, carbaryl, diazinon, napropamide, and norflurazon) were detected. None of these pesticides were detected in Ike Walton Lake, a reference (or comparison) lake that is not adjacent to commercial cranberry bogs. A 2005 U.S. Geological Survey Report on pesticides in these lakes concluded: "Data collected for this study indicate that cranberry-related pesticides are entering lakes and ground water adjacent to commercial cranberry operations in northern Wisconsin. Measured concentrations were below U.S. Environmental Protection Agency drinking-water standards and levels considered lethal to fish; however, this result does not conclude that pesticides have no effect on the lakes and aquatic biology." Pesticides have been entering these lakes, and if concentrations of these pesticides increase, there would be potential for substantial impacts on aquatic communities in these water bodies.<sup>53</sup>

D. There are also hydrological implications associated with the cranberry operations that are compounded by associated deforestation or wetland fill. According to the Tribe's Application, Cranberry operations transfer large amounts of water from the Trout River to an adjacent wetland. The Trout River contains a historically utilized wild rice bed. Wild rice is extremely sensitive to water level fluctuations at certain times during its yearly growth stages so continued impacts to the hydrological system can impact wild rice cultivation.

E. In a letter dated May 17, 1995, the WDNR, in its review of an application for an expansion at the Teske Rayala Cranberry Marsh located on the Lac du Flambeau Reservation, reported to EPA that the direct discharge of nutrients by the cranberry beds will decrease water clarity, increase algae production and accelerate aging of the lake, causing significant degradation of water quality in Great Corn Lake. The WDNR also had concerns regarding the discharge of pesticides from the cranberry operation into Great Corn Lake. The WDNR letter stated that the cranberry development constitutes a major change in watershed character.

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Bay, *Great Corn and Little Corn Lakes, Lac du Flambeau Tribal Lands, Wisconsin*, 9 App. K:3 (Sept. 2000).

<sup>52</sup>St. Paul District of U.S. Army Corps of Engineers, *Great Corn and Little Corn lakes Section 22: Water Quality Study*, App. K:6 (2000).

<sup>53</sup>U.S. Geological Survey, *Scientific Investigation Report 2005-5262, Pesticides in Surface Water, Bed Sediment, and Ground water Adjacent to Commercial Cranberry Bogs, Lac du Flambeau Reservation, Vilas County, Wisconsin, Summary and Conclusions*, <http://pubs.usgs.gov/sir/2005/5262/>.

#### 4. Forestry/Logging

As set forth in the Tribe's Application, within the Lac du Flambeau Reservation there are currently 3,151.06 acres of fee land that are enrolled in the Wisconsin Managed Forest Law program and another 1,113.07 acres in the Forest Crop Law program. The lands that are subject of these programs are productive forest lands, and these programs, as described by WDNR, are intended to encourage timber production, through various means including tax benefits. The Managed Forest Law program is primarily focused on timber production

A. There are indications that timber harvesting has affected the quality of Reservation lakes. The May 1996 University of Wisconsin study of Ike Walton Lake found evidence of decreases in the pollen of white pine and fir stands and subsequent increase in poplars, birch, and ash leading to increased lake sedimentation rates.

B. As noted above, in addition to the primary source of mercury from atmospheric deposition, forestry practices can act as important additional source of mercury loadings to forest lakes. Research found that clear-cutting and/or soil treatment significantly increases the mobility of total mercury and methylmercury accumulated in forest soil and may thus be an important factor for the total input to lakes. Testing for mercury in tissues of fish from Reservation lakes has resulted in the issuance of consumption advisories that cover fish from several Reservation lakes, including Big Crawling Stone Lake, Fence Lake, Grey Lake, and Ike Walton Lake.

C. Data on mercury in sediments provides indications there are loadings of mercury to Reservation lakes that are higher than that of other water bodies. A 2000 University of Wisconsin study found the levels of 1.4 ug/g dry weight are seven times the post-industrial levels of mercury (0.24 ug/g dry weight) measured in top sediments of 11 other lakes in north central Wisconsin. This analysis documents elevated levels in the top sediments of Little Trout Lake and Inkspot Bay. These data provide an indication there are potential local factors, such as cranberry operations or forestry operations that are contributing to the loading and mobilization of mercury through Reservation waters.<sup>54</sup>

#### 5. Sand and Gravel Mining

There have been at least three commercial sand and gravel operations on the Reservation over the last several years, including two on fee lands. These operations have the potential to impact Reservation waters by causing hydrologic changes, contributing contaminated storm water to surface water bodies, increasing the air deposition of contaminants, and by creating avenues for ground water contamination. The potential exists for further sand and gravel mining activity on the Reservation, according to a study by the Bureau of Indian Affairs.

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<sup>54</sup>Winkler, *supra* n. 50.